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Pattern of intraprostatic recurrence on multiparametric MRI after radiotherapy for prostate cancer

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Purpose or Objective: The majority of intraprostatic recurrences after radical prostate radiotherapy occur at the site of initial tumour, in previous reported series. However, there is no published data directly comparing recurrence patterns after different modalities of radiotherapy. The aim of this study was to investigate differences in spatial pattern of intra-prostatic recurrences on multiparametric MRI, after external beam radiotherapy or brachytherapy.

Material and Methods: We identified 382 consecutive patients referred for multiparametric MRI after previous prostate cancer treatment. Patients with post-radiotherapy biochemical recurrence and intraprostatic recurrence on MRI were included in the study. Scans were independently reviewed by two radiologists. The location of recurrence was mapped to prostate sectors based on European consensus guidelines. The chi-square test was used to analyse differences in site of recurrence between modalities of radiotherapy.

Results: 66 patients who had radical radiotherapy between 1997 and 2013 had intraprostatic recurrence on MRI. The D'Amico risk stratification at initial diagnosis was 14% low-risk, 34% intermediate-risk and 52% high-risk. The series consisted of 34 patients after external beam radiotherapy (EBRT), 20 patients after low-dose rate brachytherapy (LDR) and 12 after high-dose rate brachytherapy monotherapy (HDR mono). 68% of the EBRT recurrences had received a dose-fractionation schedule with an EQD2 less than 74 Gy. The mean time between the end of radiotherapy and imaging recurrence was 77 months (95% CI 68 – 85 months) with no significant differences between treatment groups. 80% of patients did not have any associated pelvic bony metastasis or nodal disease. 88% of patients had a contiguous intraprostatic recurrence. The median recurrence size detected on MRI was 2.0 cm (range 0.6 – 4.2 cm). Recurrences after EBRT were more likely to involve multiple sectors of the prostate. 71% of EBRT recurrences involved the apex compared to 30% after LDR and 25% after HDR mono (p = 0.003). In the LDR group, recurrences involved the base of the gland in 60% of cases, compared to 41% after EBRT and 8% after HDR mono (p = 0.016). 21% of patients underwent salvage treatment with cryotherapy, HDR brachytherapy or prostatectomy.

Conclusion: Apical recurrences predominated in patients following EBRT. This highlights the need for MR-fusion during EBRT target definition because the apex is difficult to visualise on CT. Basal recurrences were associated with LDR brachytherapy, which may reflect a tendency of radioactive seed migration away from the base. The use of multiparametric MRI facilitates identification of patients for focal salvage treatment.

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Risk of second primary cancers after radiotherapy for prostate cancer

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Purpose or Objective: The average 5-year survival rate of men diagnosed with prostate cancer (PCa) is 93%. The long life expectancy exposes them to a greater risk of developing second primary cancers. To quantify the risk of radiation induced second primary cancer, we analysed data of PCa patients based on our Cancer Registry.

Material and Methods: We analysed 19.538 patients treated for PCa from 1988 until 2008. They were either treated with surgery (RPE only) or received radiation therapy as primary (RT only) or as postoperative treatment (RT after RPE). Statistical analysis was performed using a stratified Cox proportional hazard model and a chi-square test.

Results: Patients who received RT only were 5 years older (median) than patients who underwent RPE only or RT after RPE. Second primary cancers were observed with 13.1% and 13.6% in the RPE only and in the RT after RPE group and 16.4% in the RT only group (p= 0.0001), respectively. Colon carcinoma was seen in the RPE only and RT only group in roughly 10 percent, whereas in the RT after RPE group in 14.6% (p= 0.2140). Bronchial cancer surpassed 10% in the RT only group (12.5%) vs. 9.7% and 7.8% in the RPE only and the RT after RPE group (p= 0.0552). Bladder cancer was observed with roughly 10% in the RPE only (10.2%) and RT after RPE (10.4%) group versus 15.5% in the RT only group (p= 0.0007). Rectal cancer after treatment of PCa was diagnosed in 5.7%, 7% and 3.1% in the RPE only, RT only and RT after RPE group (p= 0.1037). Within the first 10 – 15 years the cumulative hazard curves for second primary cancers gave no hint to an increased tumor risk due to prior treatment. After 15 years there are hardly any cases left and the occurring events can no longer be reasonably interpreted. Cox proportional hazard ratio revealed that patients with a higher age have a significantly higher risk of developing second primary cancer (Hazard Ratio 1.279 in 60 - <65 year old patients vs. 2.169 in ≥75 year old patients, p <0.0001).

Conclusion: Based on this population with PCa from the PSA era the incidences of second primary cancers did not differ significantly between the three arms apart from bladder and lung cancer that came close to being significantly different. However, these differences cannot reliably be ascribed to radiation, but to other factors such as older age, lifestyle habits like smoking and the well known fact that cancer survivors generally have an increased risk of new tumor formation.

Proffered Papers: Clinical 8: Adult and paediatric CNS malignancies

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Patterns of failure after radiotherapy in pediatric ependymoma: correlation with dose parameters

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